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Department of
Agriculture

Soil
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Bozeman,
Montana

Montana Water Supply Outlook

January 1, 1989

FEB 10 1989

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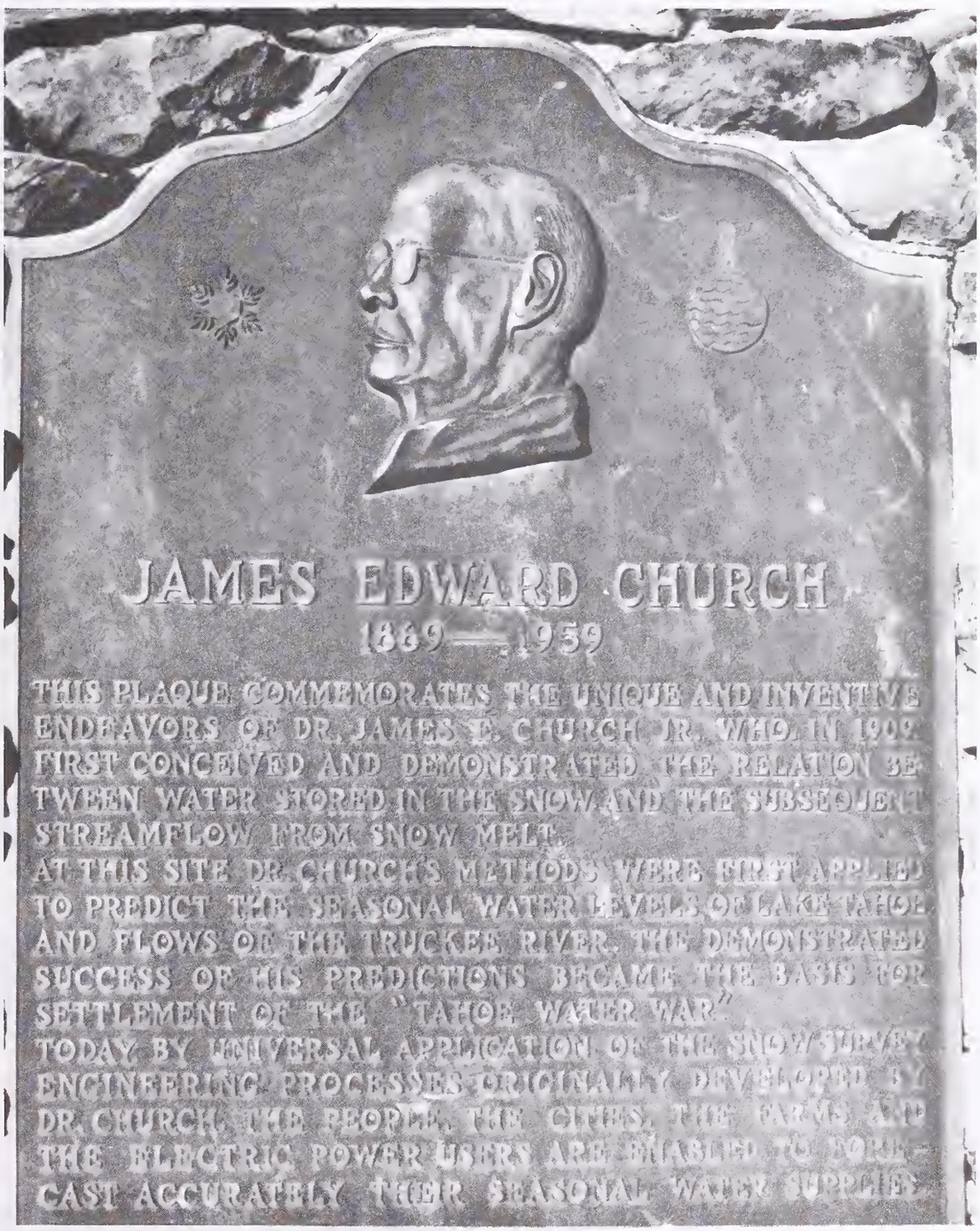
JAMES EDWARD CHURCH
1869—1959
THIS PLAQUE COMMEMORATES THE UNIQUE AND INVENTIVE
ENDEAVORS OF DR. JAMES E. CHURCH JR. WHO IN 1902
FIRST CONCEIVED AND DEMONSTRATED THE RELATION BE-
TWEEN WATER STORED IN THE SNOW AND THE SUBSEQUENT
STREAMFLOW FROM SNOW MELT.
AT THIS SITE DR CHURCH'S METHODS WERE FIRST APPLIED
TO PREDICT THE SEASONAL WATER LEVELS OF LAKE TAHOE
AND FLOWS OF THE TRUCKEE RIVER. THE DEMONSTRATED
SUCCESS OF HIS PREDICTIONS BECAME THE BASIS FOR
SETTLEMENT OF THE "TAHOE WATER WAR"
TODAY BY UNIVERSAL APPLICATION OF THE SNOW SURVEY
ENGINEERING PROCESSES ORIGINALLY DEVELOPED BY
DR. CHURCH, THE PEOPLE, THE CITIES, THE FARMS AND
THE ELECTRIC POWER USERS ARE ENABLED TO FORE-
CAST ACCURATELY THEIR SEASONAL WATER SUPPLIES

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Foreword

How Forecasts Are Made

Most of the annual streamflow in the Western United States originates as snowfall that has accumulated high in the mountains during winter and early spring. As the snowpack accumulates, hydrologists estimate the runoff that will occur when it melts. Predictions are based on careful measurements of snow water equivalent at selected index points. Precipitation, temperature, soil moisture and antecedent streamflow data are combined with snowpack data to prepare runoff forecasts. Streamflow forecasts are coordinated by Soil Conservation Service and National Weather Service hydrologists. This report presents a comprehensive picture of water supply outlook conditions for areas dependent upon surface runoff. It includes selected streamflow forecasts, summarized snowpack and precipitation data, reservoir storage data, and narratives describing current conditions.

Snowpack data are obtained by using a combination of manual and automated measurement methods. Manual readings of snow depth and water equivalent are taken at locations called snow courses on a monthly or semi-monthly schedule during the winter. In addition, snow water equivalent, precipitation and temperature are monitored on a daily basis and transmitted via radio telemetry to central data collection facilities. Both monthly and daily data are used to project snowmelt runoff.

An error is associated with each forecast, and this error decreases as the season progresses and more data becomes available. To express the range of error that can be expected, "most probable" forecasts are issued along with a range representing a "reasonable minimum" and a "reasonable maximum". Actual streamflow can be expected to fall within this range in eight out of ten years. Additionally two specific scenarios are provided based on the assumption that subsequent precipitation will be "wet", above average, or "dry", below average.

For More Information

Copies of Monthly Water Supply Outlook Reports and other reports may be obtained from the states listed below. An annual snow survey data summary is published by the Soil Conservation Service for each of the western states. Historical snow survey data may be obtained at those same offices.

STATE	ADDRESS
Alaska	201 East 9th Ave., Suite 300, Anchorage, AK 99501-3687
Arizona	201 East Indianola Ave., Suite 200, Phoenix, AZ 85012
Colorado	2490 West 26th Ave., Building A, 3rd floor, Denver, CO 80211
Idaho	3244 Elder Street, Room 124, Boise, ID 83705
Montana	10 East Babcock, Room 443, Federal Building, Bozeman, MT 59715
Nevada	1201 Terminal Way, Room 219, Reno, NV 89502
New Mexico	517 Gold Ave. S.W., Room 3301, Albuquerque, NM 87102-3157
Oregon	1220 Southwest 3rd Ave., Room 1640, Portland, OR 97204
Utah	4402 Federal Building, 125 South State Street, Salt Lake City, UT 84147
Washington	W. 920 Riverside, Room 360, Spokane, WA 99201-1080
Wyoming	Federal Building, 100 "B" Street, Room 3124, Casper, WY 82601

In addition to state reports, a Water Supply Outlook for the Western United States is published by the Soil Conservation Service and National Weather Service monthly, January through May. Reports may be obtained from the Soil Conservation Service, West National Technical Center, 511 Northwest Broadway, Room 248, Portland, OR 97209-3489.

Water supply reports published by other agencies:

California — Snow Survey Branch, California Department of Water Resources, P.O. Box 388, Sacramento, CA 95802; British Columbia — The Ministry of Environment, Water Investigations Branch, Parliament Buildings, Victoria, British Columbia, V8V 1X5; Yukon Territory — Department of Indian and Northern Affairs, Northern Operations Branch, 200 Range Road, Whitehorse, Yukon Territory, Y1A3V1; Alberta, Environment Technical Services Division, 9820 106th St., Edmonton, Alberta T5K 2J6.

Montana
Water Supply Outlook

and

Federal - State - Private
Cooperative Snow Surveys

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Programs and assistance of the United States Department of Agriculture are available without regard to race, creed, color, sex, age, or national origin.

ON THE COVER:

This plaque on the outlet gate at Lake Tahoe, Nevada, commemorates the start of snow surveys in 1909.

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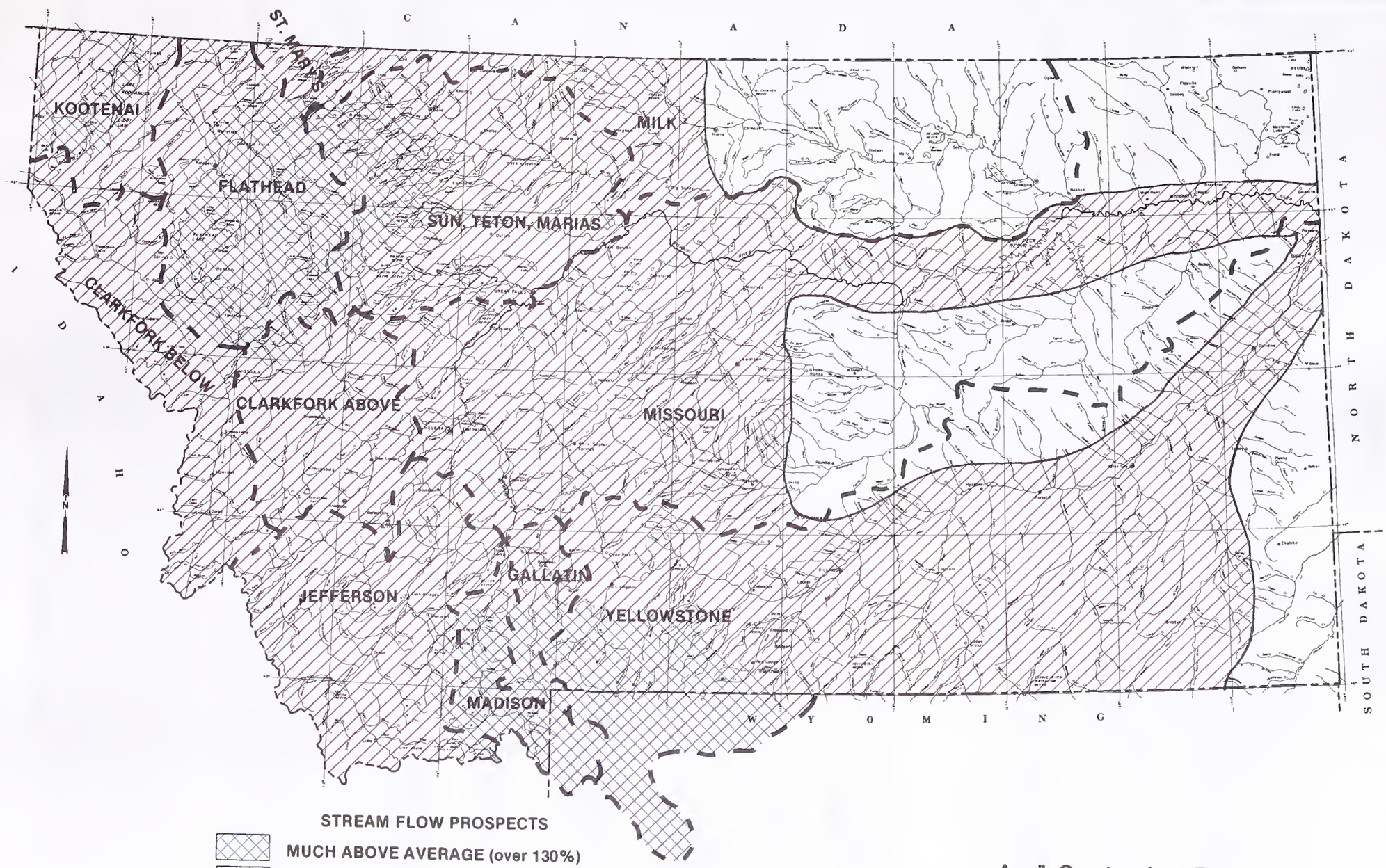
U.S DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE



STREAMFLOW PROSPECTS FOR MONTANA

Spring and Summer Period

April–September Forecasts

January 1, 1989

STREAM FLOW PROSPECTS

- MUCH ABOVE AVERAGE (over 130%)
- ABOVE AVERAGE (110-130%)
- NEAR AVERAGE (90-110%)
- BELOW AVERAGE (70-90%)
- MUCH BELOW AVERAGE (below 70%)
- NOT FORECAST

0 25 50 75 100 MI

0 50 100 150 KM

SOURCE:
Information provided by SCS Snow Survey Personnel.

JUNE 1985 4-R-39296

USDA SCS-FORT WORTH TEXAS 1985

General Outlook

HYDROLOGIC EFFECT OF 1988 FIRES

The SCS has developed preliminary estimates of the increased spring runoff expected to occur as a result of fires during the summer of 1988. Current estimates will be revised as more site information is assembled and procedures are refined.

Based on currently available information, the following increases are projected for the affected forecast points included in this report:

Location	% Drainage burned *	%Increased Runoff Apr-Jul	Apr-Sept
Clark FK ab Missoula			
Lower Willow Inflow	9	5	5
Madison			
Madison nr Grayling	38	13	12
Gallatin			
Gallatin nr Gateway	7	3	3
Sun-Teton-Marias			
Sun R. at Gibson Dam	6	1	1
Yellowstone			
Yellowstone Lake Outlet	42	15	14
Yellowstone at Corwin	41	11	11
Clarks nr Belfry	10	3	3

Increases are included in the forecast values and in all appropriate downstream forecasts.

* Only considers timbered areas with canopy burn.

Summary

Most mountain soils are drier than usual. Northern areas have picked up good precipitation in October and November but below average amounts in December. Southern areas had good moisture in November but October and December were generally below average. Snowpacks are near to above average in the headwaters of the Bitterroot, Beaverhead, Madison and Yellowstone Rivers and below to well below average elsewhere. Irrigation reservoir storage is generally below average but there are a few projects reporting near to above average water in storage. Spring and summer runoff is forecast to be below average on more drainages except those in southern and northwest Montana where near to above average flows are expected.

Snowpack

The mountain snowpack is below average over most of the state. In the extreme southwest corner, the headwaters of the Bitterroot, Beaverhead, Madison and Yellowstone Rivers have a snowpack that is near to above average. There is also an area southeast of Kalispell that is near average. In central and south-central Montana snowpacks are below average.This area encompasses the headwaters of the Clark Fork and Blackfoot Rivers (west of the Divide), the Clark's Fork of the Yellowstone River and almost all tributaries to the Missouri River downstream from Canyon Ferry Reservoir. Some areas in the Kootenai, Flathead and St. Mary Drainages also have well below average snowpack. In other areas the snow cover is generally 70 to 80 percent of average. About 40 percent of the season's snowpack should be on the ground at this time of year.

Precipitation

This past summer was extremely dry. September precipitation was a little below average in the northern half of the State and about one-half average across the southern areas. October followed similar patterns with near to above average precipitation across the northern mountains and below average amounts in the southern areas. November moisture was near average in central Montana mountain ranges and above to well above average elsewhere. December precipitation was generally 50 to 70 percent of average over most of the State while only the Madison River Headwaters was near average.

Reservoirs

Storage in most irrigation reservoirs is below average due to dry summers and below average runoff. However, those in the St. Mary, Marias and offstream reservoirs in the Sun Drainages have near to above average storage. Cooney Reservoir is also reporting near average storage while Tongue River Reservoir is reporting above average storage.

Streamflow

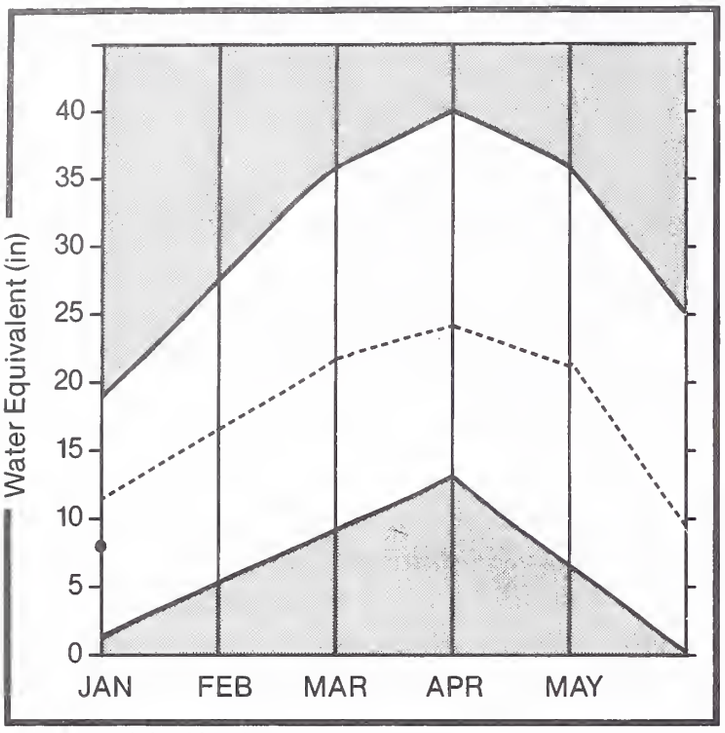
Based on current snowpacks, soil moisture conditions and near average moisture for the remainder of the season, most streams in the southwest and northwest parts of the State are forecast to produce near to a little above average runoff this spring and summer. Drainages in central Montana could see below average runoff again this summer if weather patterns do not improve toward more normal moisture flow. Most streams and rivers in other areas are forecasted to have 80 to 90 percent of average runoff.

Soil Moisture

Soils under the snow are drier than usual over most of the State. In general, the southern areas have well below average levels of moisture in the mountains soils while areas near the Canadian Border, west of the Divide, have near average soil moisture. A portion of this spring's snowmelt will be required to recharge these soils before any significant runoff can occur.

Kootenai Basin

Mountain snowpack* (inches)



*Kootenai in Montana

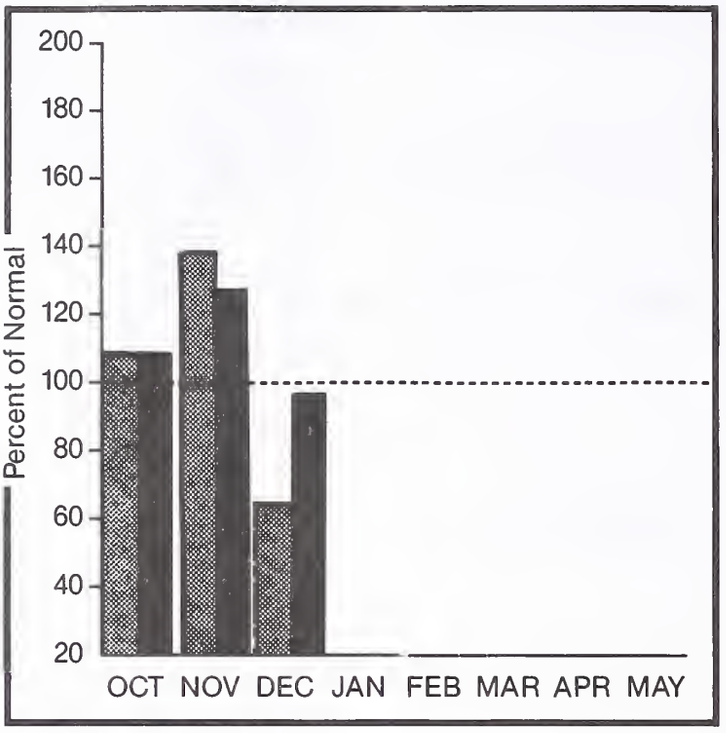
Maximum

Minimum

Average

Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation

Year to date precipitation

Water Supply Outlook

Snow measurements begin in British Columbia next month. Snowpack in the Montana portion of the Kootenai River Drainage is about 40 percent greater than a year ago but only about 70 percent of average. Early season precipitation was generally near to above average but December moisture dropped to about 65 percent of average. Soils under the snowpack are a little drier than normal. Spring and summer runoff is forecast to be a little below average on the Kootenai River and below average on tributary streams in Montana.

For more information contact your local Soil Conservation Service office.

KOOTENAI RIVER BASIN in Montana

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
KOOTENAI bl Libby Dam (2)	APR-JUL	5700	97			7580	3990	5885
	APR-SEP	6690	97			8900	4690	6903
FISHER nr Libby	APR-JUL	197	82	265	127	270	125	240
	APR-SEP	210	82	280	138	285	133	256
YAAK nr Troy	APR-JUL	360	73	475	245	510	210	494
	APR-SEP	385	74	500	275	540	230	517
KOOTENAI at Leonia (2)	APR-JUL	7170	98			9520	4890	7340
	APR-SEP	8250	98			11000	5630	8441

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
LAKE KOOCANUSA	5748.0	2072.0	3114.0	3235.0

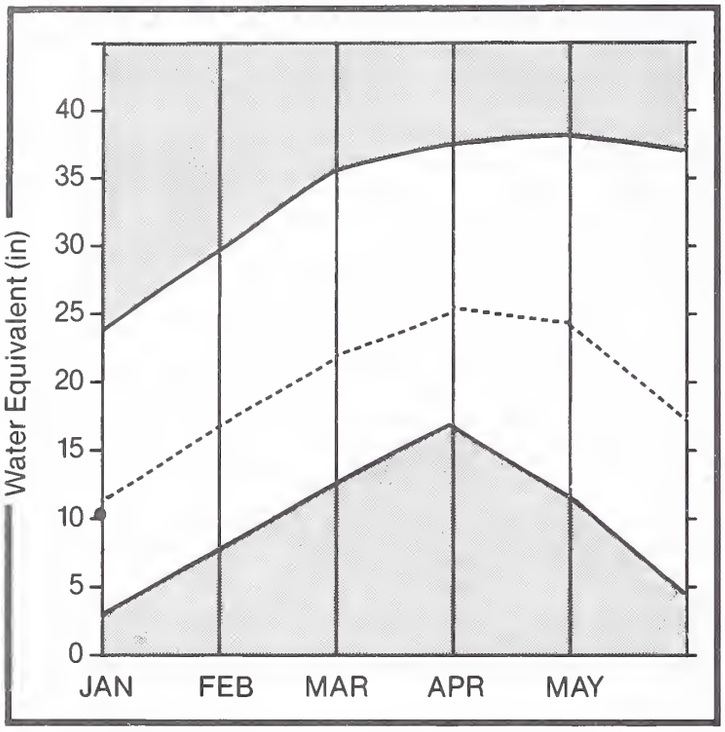
WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	AVERAGE
EAST KOOTENAI in B.C.	8	112	57
KOOTENAI in MONTANA	16	137	72
KOOTENAI ab BONNERS FERRY	23	130	67

WET SUBS. and DRY SUBS. represent 150 and 50 percent subsequent precipitation events respectively.
REAS. MAX. and REAS. MIN. forecasts are for 10% and 90% exceedance levels with the exception of (1) below.
(1) - REAS. MAX. and REAS. MIN. forecasts are for 5% and 95% exceedance levels.
(2) - Corrected for upstream diversions or changes in reservoir storage.

Flathead Basin

Mountain snowpack* (inches)



*Flathead

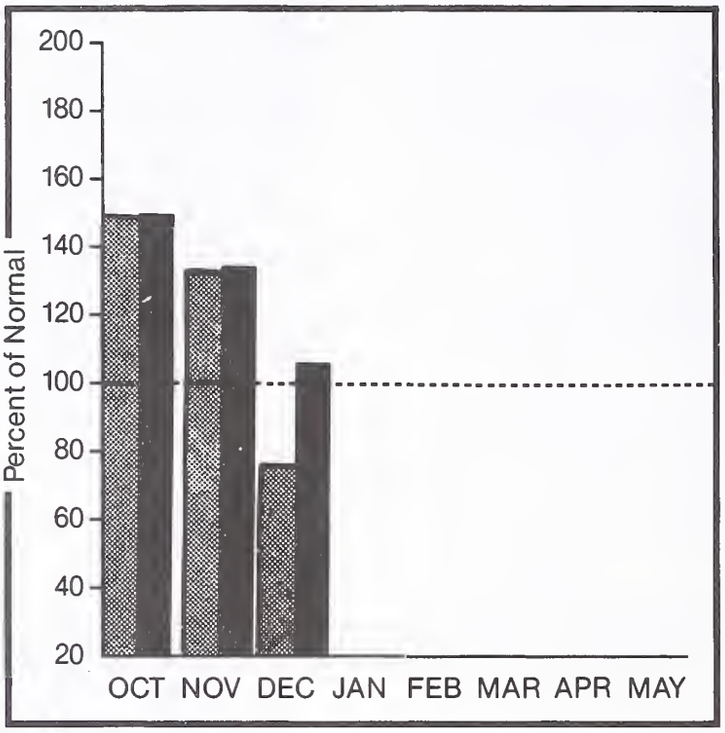
Maximum

Minimum

Average

Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation

Year to date precipitation

Water Supply Outlook

October and November were good precipitation months but December mountain precipitation was only about 75 percent of average. The snowpack is now about 80 percent of average in the North and Middle Forks of the Flathead River increasing to near average in the Swan River Drainage. Soils under the snowpack have about average levels of moisture. Spring and summer runoff is expected to be a little below average on the Swan River and the three Forks of the Flathead River and below average on the Stillwater, Whitefish and Little Bitterroot Rivers.

For more information contact your local Soil Conservation Service office.

FLATHEAD RIVER BASIN

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
NF FLATHEAD nr Columbia Falls	APR-JUL	1480	87	1740	1220	1890	1070	1701
	APR-SEP	1640	87	1900	1400	2090	1190	1880
MF FLATHEAD nr West Glacier	APR-JUL	1510	90	1800	1220	1950	1070	1680
	APR-SEP	1650	90	1930	1370	2130	1170	1836
SF FLATHEAD nr Columbia Falls (1)	APR-JUL	2000	95	2380	1620	2590	1410	2110
	APR-SEP	2130	95	2490	1770	2760	1500	2248
FLATHEAD at Columbia Falls (1)	APR-JUL	5110	91	6010	4320	6460	3760	5621
	APR-SEP	5560	91	6480	4700	7030	4090	6114
SWAN nr Bigfork	APR-JUL	575	96	665	485	695	455	597
	APR-SEP	650	95	740	555	785	515	683
FLATHEAD nr Polson (2)	APR-JUL	6070	92	7060	5080	7390	4750	6586
	APR-SEP	6590	92	7590	5590	8020	5160	7150

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
CAMAS (4)	45.2	6.2	14.4	19.2
MISSION VALLEY (8)	100.0	2.5	24.4	34.1
HUNGRY HORSE	3451.0	1631.0	2039.0	2649.0
FLATHEAD LAKE	1791.0	887.0	929.0	1340.0

WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	AVERAGE
NORTH FORK FLATHEAD	9	162	81
MIDDLE FORK FLATHEAD	10	161	82
SOUTH FORK FLATHEAD	11	191	102
STILLWATER-WHITEFISH	3	153	82
SWAN	9	195	105
LITTLE BITTERROOT	3	121	65
FLATHEAD	33	172	89

WET SUBS. and DRY SUBS. represent 150 and 50 percent subsequent precipitation events respectively.
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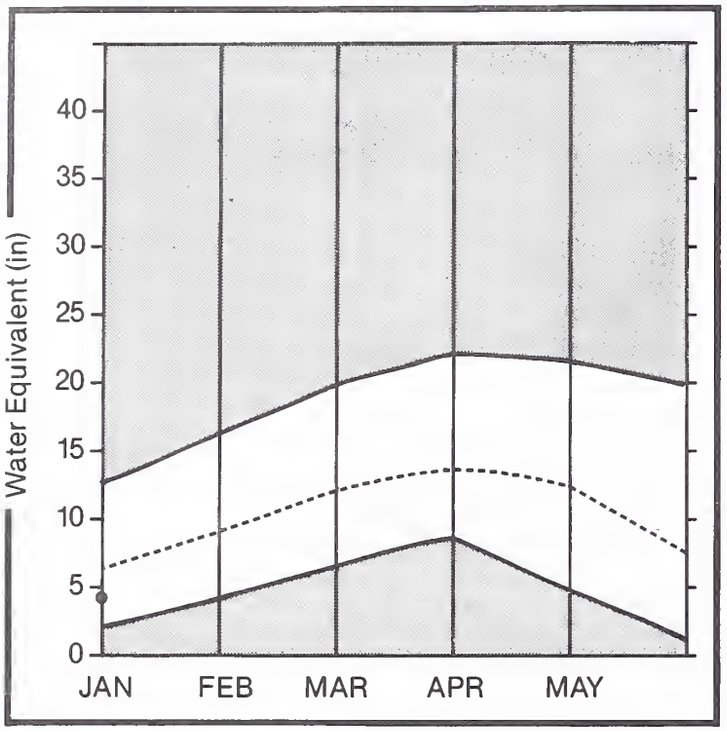
(1) - REAS. MAX. and REAS. MIN. forecasts are for 5% and 95% exceedance levels.
(2) - Corrected for upstream diversions or changes in reservoir storage.

Clark Fork Basin above Missoula

Mountain snowpack* (inches)



*Clark Fork above Missoula

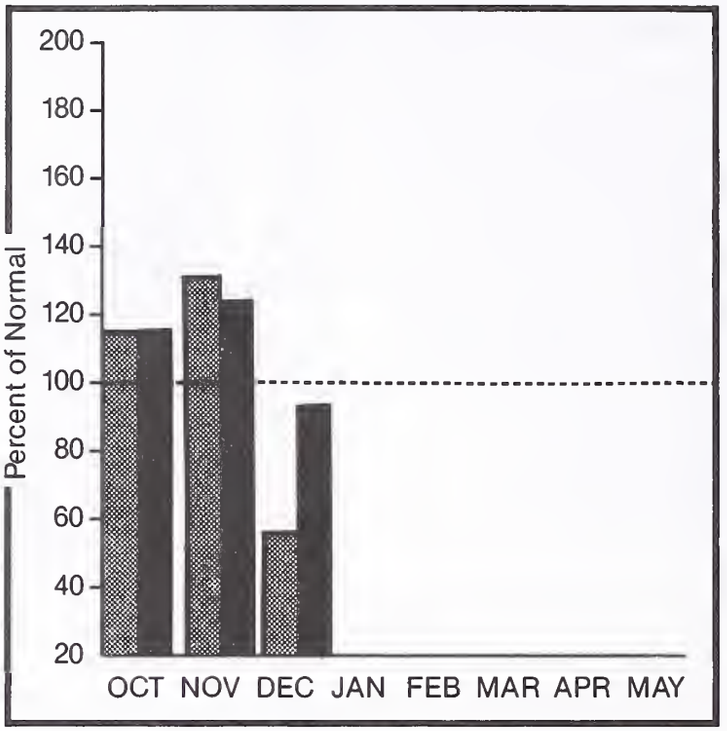
Maximum

Minimum

Average

Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation

Year to date precipitation

Water Supply Outlook

Mountain precipitation in October and November was a little above average but December was about one-half average. Mountain snowpack is currently about 65 percent of average in the Clark Fork drainage and about 75 percent of average in the Blackfoot. Soil moisture in the mountains is generally below average. Forecasts of spring and summer runoff are for below average flows from most drainages.

For more information contact your local Soil Conservation Service office.

CLARK FORK RIVER BASIN below Missoula

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
CLARK FORK ab Missoula	APR-JUL	1380	88	1810	940	2040	720	1577
	APR-SEP	1560	88	2010	1100	2310	810	1781
WF BITTERROOT nr Conner (2)	APR-JUL	132	90	185	79	176	88	147
	APR-SEP	143	85	199	89	194	92	169
BITTERROOT nr Darby	APR-JUL	465	89	620	295	620	310	524
ROCK CK nr Darby		510	89	675	345	680	340	573
SKALKAHO CK nr Hamilton	APR-JUL	40	87	52	27	49	31	46
	APR-SEP	47	87	59	34	58	36	54
BURNT FORK CK nr Stevensville (2)	APR-JUL	28	88	34	21	38	18.4	32
	APR-SEP	32	84	39	25	43	21	38
BITTERROOT at Missoula (2)	APR-JUL	1200	88	1560	845	1610	790	1371
	APR-SEP	1320	88	1680	945	1770	870	1497
CLARK FORK bl Missoula	APR-JUL	2590	88	3390	1760	3300	1880	2948
	APR-SEP	2870	88	3690	2050	3660	2080	3276
CLARK FORK at St. Regis	APR-JUL	3360	86			5150	1570	3894
	APR-SEP	3730	86			5720	1740	4325
CLARK FORK nr Plains (2)	APR-JUL	9550	88			13900	5210	10850
	APR-SEP	10500	88			15300	5850	11930
THOMPSON nr Thompson Falls	APR-JUL	174	78	230	121	235	112	222
	APR-SEP	199	80	255	144	270	129	250
PROSPECT CK at Thompson Falls	APR-JUL	113	88	140	86	151	75	128
	APR-SEP	122	89	148	96	163	81	137
CLARK FORK at Whitehorse Rapids (2)	APR-JUL	10400	86			15300	5540	12150
	APR-SEP	11500	86			16700	6150	13370

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
PAINTED ROCKS LAKE	31.7	0.0	0.0	16.5
NOXON RAPIDS	335.0	318.4	320.5	318.1
COMO	34.9	8.6	4.4	9.2

WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	AVERAGE
CLARK FORK above MISSOULA	46	121	68
BITTERROOT	20	142	90
LWR CLARK FK blw MISSOULA	15	157	83
BITTERROOT & LWR C.F.	34	149	86
CLARK FORK TOTAL	76	141	79
FLATHEAD	32	171	89
PEND O'REILLE	103	151	82

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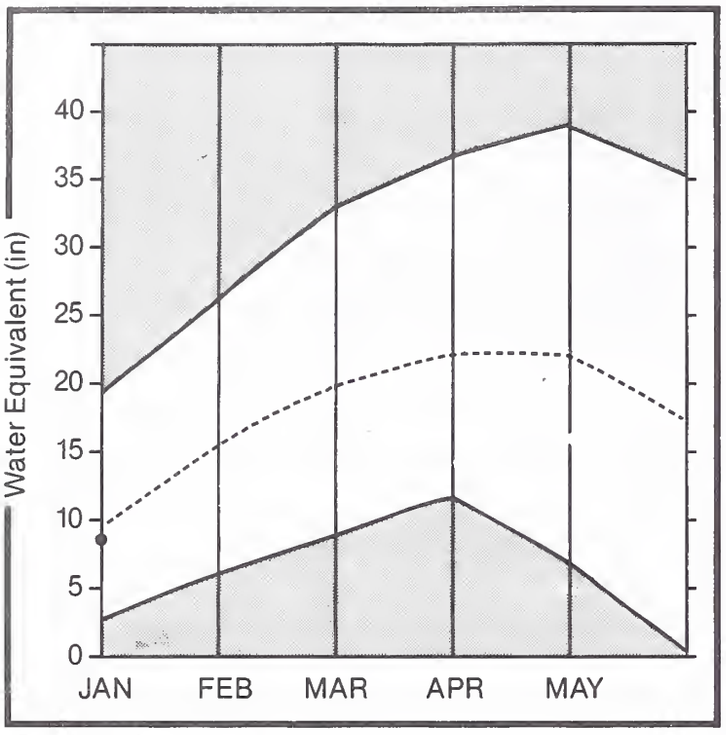
Clark Fork Basin below Missoula

Mountain snowpack* (inches)



*Bitterroot

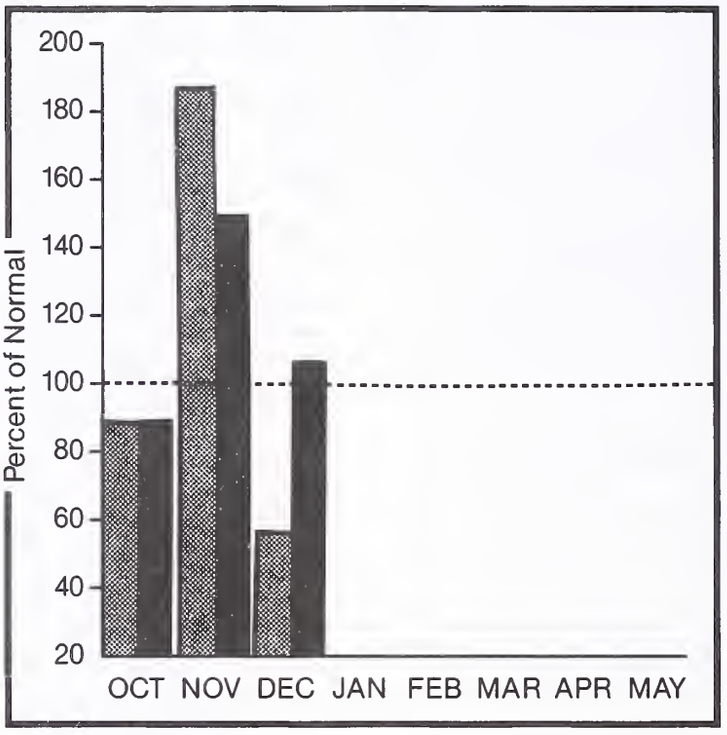
Maximum

Minimum

Average

Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation

Year to date precipitation

Water Supply Outlook

October and December precipitation was below average in the mountains while November was nearly twice that of average. Snowpack is currently near average in the southern part of the Bitterroot decreasing to about 70 percent of average on the lower Clark Fork tributaries. Mountain moisture is generally below average. Streamflow is forecast to be a little below average in the Bitterroot and below average on the Clark Fork and downstream tributaries.

For more information contact your local Soil Conservation Service office.

CLARK FORK RIVER BASIN below Missoula

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
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CLARK FORK bl Missoula	APR-JUL	2590	88	3390	1760	3300	1880	2948
	APR-SEP	2870	88	3690	2050	3660	2080	3276
CLARK FORK at St. Regis	APR-JUL	3360	86			5150	1570	3894
	APR-SEP	3730	86			5720	1740	4325
CLARK FORK nr Plains (2)	APR-JUL	9550	88			13900	5210	10850
	APR-SEP	10500	88			15300	5850	11930
THOMPSON nr Thompson Falls	APR-JUL	174	78	230	121	235	112	222
	APR-SEP	199	80	255	144	270	129	250
PROSPECT CK at Thompson Falls	APR-JUL	113	88	140	86	151	75	128
	APR-SEP	122	89	148	96	163	81	137
CLARK FORK at Whitehorse Rapids (2)	APR-JUL	10400	86			15300	5540	12150
	APR-SEP	11500	86			16700	6150	13370

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
PAINTED ROCKS LAKE	31.7	0.0	0.0	16.5
NOXON RAPIDS	335.0	318.4	320.5	318.1
COMO	34.9	8.6	4.4	9.2

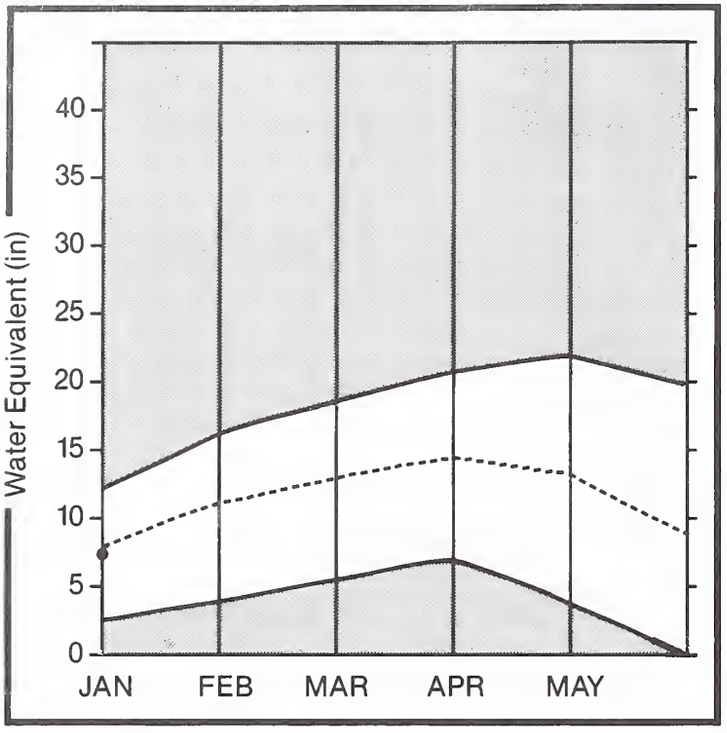
WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	THIS YEAR AS % OF AVERAGE
CLARK FORK above MISSOULA	46	121	68
BITTERROOT	20	142	90
LWR CLARK FK blw MISSOULA	15	157	83
BITTERROOT & LWR C.F.	34	149	86
CLARK FORK TOTAL	76	141	79
FLATHEAD	32	171	89
PEND O'REILLE	103	151	82

WET SUBS. and DRY SUBS. represent 150 and 50 percent subsequent precipitation events respectively.
REAS. MAX. and REAS. MIN. forecasts are for 10% and 90% exceedance levels with the exception of (1) below.
(1) - REAS. MAX. and REAS. MIN. forecasts are for 5% and 95% exceedance levels.
(2) - Corrected for upstream diversions or changes in reservoir storage.

Jefferson Basin

Mountain snowpack* (inches)



*Jefferson

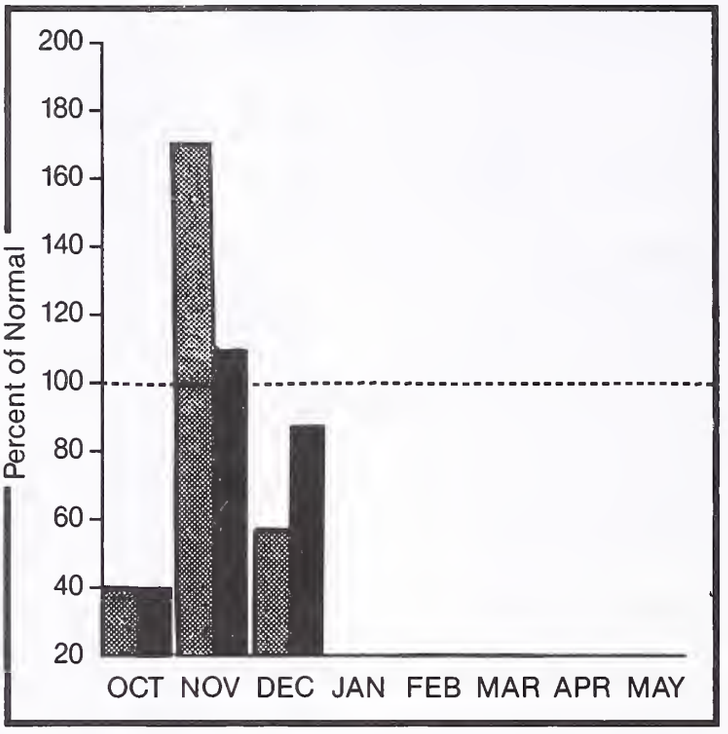
Maximum

Minimum

Average

Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation

Year to date precipitation

Water Supply Outlook

Mountain precipitation was well below average in October, increasing to well above average in November and dropping to well below average again in December.The mountain snowpack varies from above average in the Beaverhead River Headwaters to well below average in the Boulder River Drainage. Soils under the snowpack are drier than average. Spring and summer streamflow is expected to be about 85 percent of average on southern tributaries and about 80 percent of average on the more northernly streams.

For more information contact your local Soil Conservation Service office.

JEFFERSON RIVER BASIN

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
RED ROCK RIVER near Monida 2	APR-JUL	92	88	148	37	134	50	105
	APR-SEP	99	87	169	42	145	53	114
BEAVERHEAD RIVER near Grant 2	APR-JUL	120	81	270	54	180	60	149
	APR-SEP	145	83	335	61	215	75	175
BEAVERHEAD RIVER at Barratts 2	APR-JUL	163	85	320	94	240	86	192
	APR-SEP	195	87	395	108	285	105	224
RUBY RIVER near Alder	APR-JUL	73	82	115	32	105	41	89
	APR-SEP	90	85	136	43	128	52	106
BIG HOLE RIVER near Melrose	APR-JUL	550	79	970	215	785	315	696
	APR-SEP	615	81	1070	235	870	360	757
WILLOW CREEK near Harrison	APR-JUL	13.0	70	29	4.8	20	5.5	18.7
	APR-SEP	15.0	71	33	5.3	23	6.6	21
BOULDER RIVER near Boulder	APR-JUL	73	80	149	29	106	40	91
	APR-SEP	80	82	161	32	115	45	97
JEFFERSON RIVER near Three Forks	APR-JUL	790	76	1670	320	1210	375	1042
	APR-SEP	910	79	1870	355	1370	450	1156

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
LIMA	84.0	8.8	11.6	35.3
CLARK CANYON	255.6	96.4	162.6	142.2
RUBY RIVER	38.8	16.4	17.7	20.3

WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	AVERAGE
BEAVERHEAD	21	183	122
RUBY	4	144	88
BIGHOLE	20	129	78
BOULDER	12	119	64
JEFFERSON	47	157	97

WET SUBS. and DRY SUBS. represent 150 and 50 percent subsequent precipitation events respectively.
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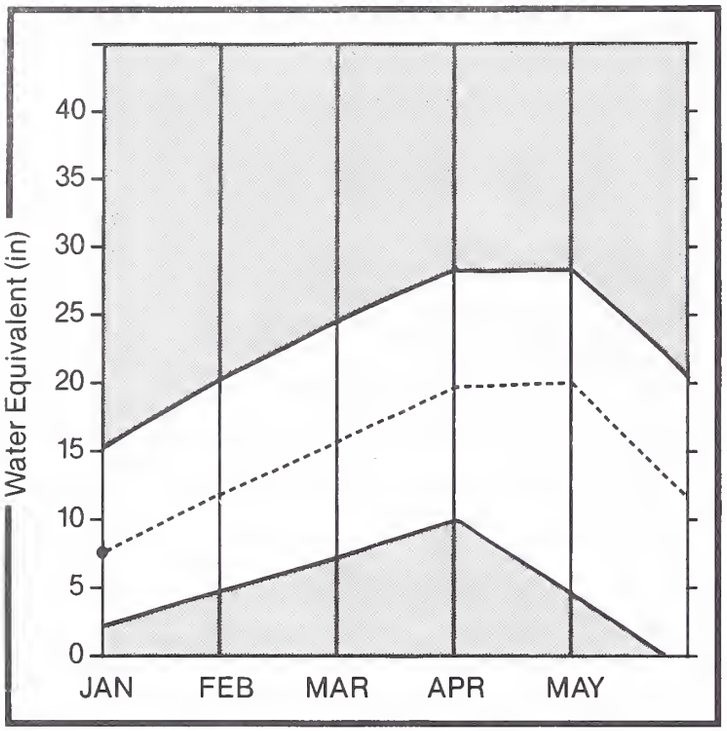
(2) - Corrected for upstream diversions or changes in reservoir storage.

Madison Basin

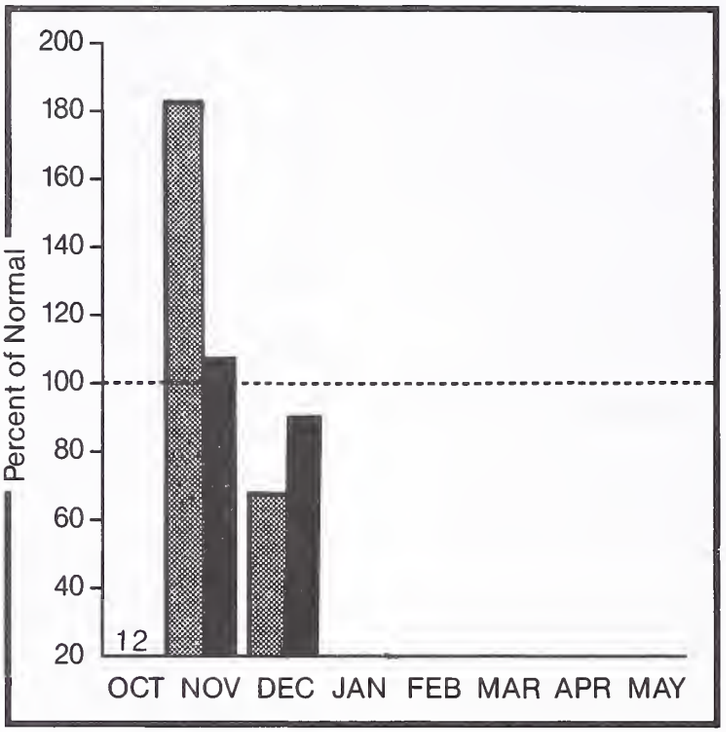
Mountain snowpack* (inches)



*Madison

Maximum
Minimum
Average
Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation
Year to date precipitation

Water Supply Outlook

Very little moisture fell in October while November was well above average. Snowpacks in the upper Madison are a little above average dropping to a little below average on headwaters of tributaries below Hebgen Lake. Soils under the snowpack are drier than normal. Streamflow is forecast to be a little above average on the upper Madison and near average downstream.

For more information contact your local Soil Conservation Service office.

MADISON RIVER BASIN

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
MADISON RIVER near Grayling 2	APR-JUL	420	108	570	270	500	340	390
	APR-SEP	525	105	700	350	625	425	499
MADISON RIVER near McAllister 2	APR-JUL	695	102	1010	380	845	545	680
	APR-SEP	855	100	1210	520	1040	665	856

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
ENNIS LAKE	41.0	28.3	31.3	34.4
HEBGEN LAKE	377.5	265.2	274.2	242.1

WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	THIS YEAR AS % OF AVERAGE
MADISON above HEBGEN	13	176	111
LOWER MADISON	10	139	90
MADISON	23	169	102

WET SUBS. and DRY SUBS. represent 150 and 50 percent subsequent precipitation events respectively.
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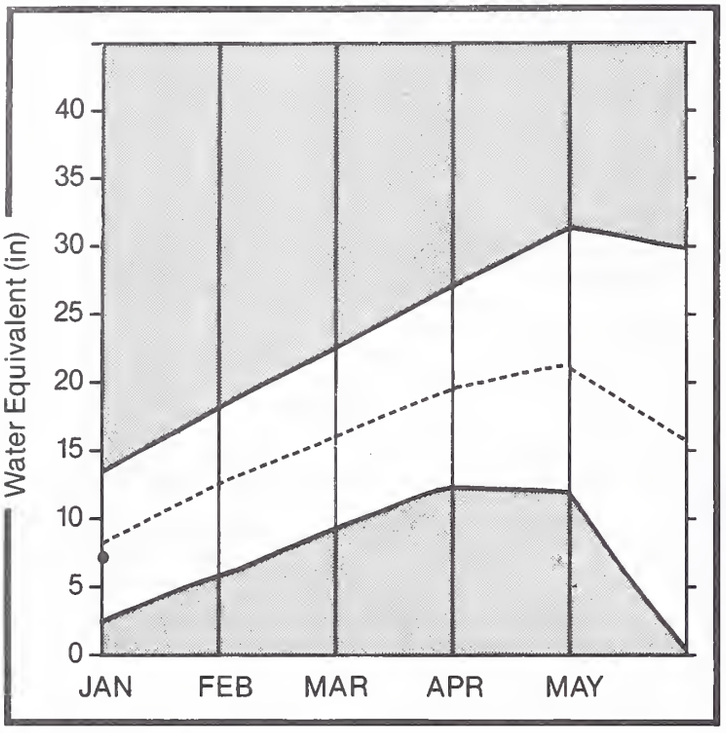
Gallatin Basin

Mountain snowpack* (inches)



*Gallatin

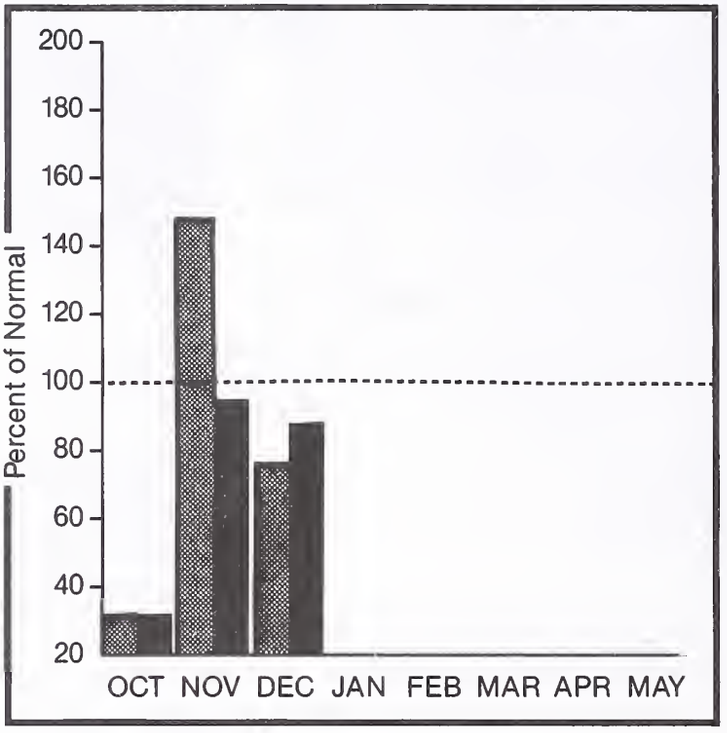
Maximum

Minimum

Average

Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation

Year to date precipitation

Water Supply Outlook

Mountain precipitation was well below average in October but increased to above average in November. December moisture again dropped to below average. Currently, snowpacks in the Gallatin are about 85 percent of average with snow in the upper Gallatin and Bridger Mountains a little better than in the Hyalite area south of Bozeman. Soils under the snowpack are drier than normal. Spring and summer streamflow is forecast to be about 85 percent of average on most streams.

For more information contact your local Soil Conservation Service office.

GALLATIN RIVER BASIN

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
GALLATIN RIVER near Gateway	APR-JUL	405	88	665	147	505	305	460
	APR-SEP	480	89	750	188	600	360	540
E & W FK. HYALITE CR. nr Bozeman 2	APR-JUL	21	88	33	10.0	27	15.2	24
	APR-SEP	24	86	38	11.1	31	17.3	28
HYALITE CREEK near Bozeman 2	APR-JUL	33	87	54	11.3	42	24	38
	APR-SEP	37	84	61	14.1	48	26	44
GALLATIN RIVER at Logan	APR-JUL	455	86	890	191	615	295	528
	APR-SEP	530	86	980	215	715	345	616

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
MIDDLE CREEK	8.0	4.9	5.1	3.1

WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	THIS YEAR AS % OF AVERAGE
UPPER GALLATIN	10	161	82
EAST GALLATIN	11	164	76
GALLATIN	18	165	83

WET SUBS. and DRY SUBS. represent 150 and 50 percent subsequent precipitation events respectively.
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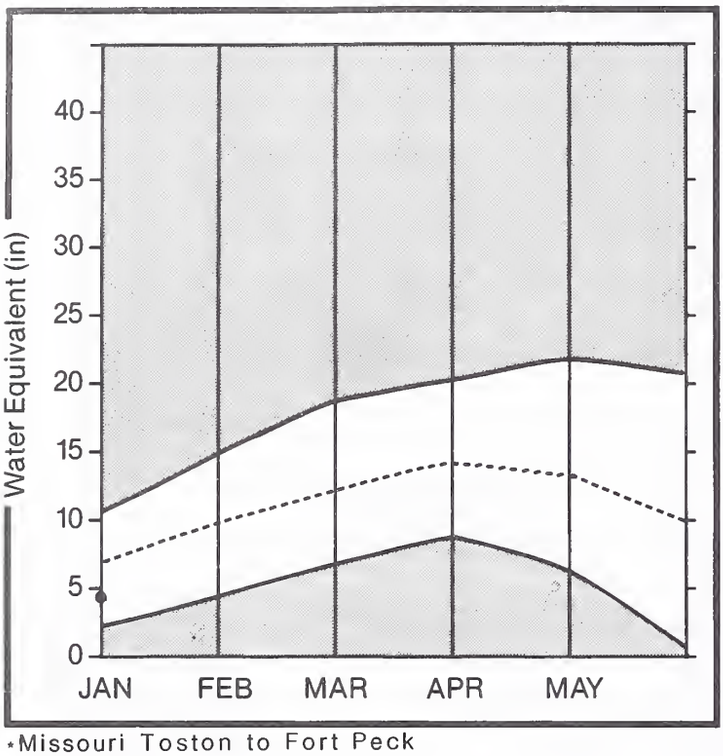
Missouri Basin

Mountain snowpack* (inches)



*Missouri Toston to Fort Peck

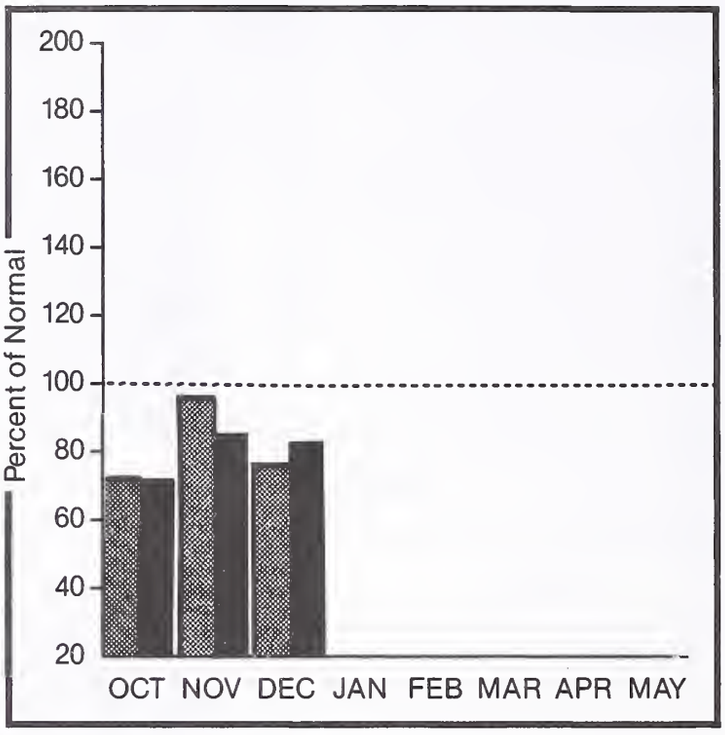
Maximum

Minimum

Average

Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation

Year to date precipitation

Water Supply Outlook

October and December mountain precipitation was below average while November was near average. Snowpacks in the headwaters of most tributaries to the Missouri are below average generally in the 60 to 70 percent of average range. The soils under the snow are drier than average. Streams flowing into the Missouri are forecasted to have 70 to 80 percent of average runoff this spring and summer. The Missouri River should have flows in the 85 to 90 percent of average range.

For more information contact your local Soil Conservation Service office.

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
MISSOURI RIVER at Toston 2	APR-JUL	1960	87			2610	1290	2250
	APR-SEP	2280	88			3060	1450	2590
PRICKLY PEAR CREEK nr Clancy	APR-JUL	20	77	37	6.7	32	8.3	26
	APR-SEP	25	81	44	7.9	39	11.1	31
SMITH RIVER nr Ft. Logan	APR-JUL	48	71	108	17.4	77	19.4	68
	APR-SEP	58	73	123	22	92	24	80
SHEEP CREEK nr White Sulphur Spgs.	APR-JUL	14.0	74	23	4.4	22	5.5	18.8
	APR-SEP	16.0	73	27	5.7	26	6.1	22
BELT CREEK near Monarch	APR-JUL	96	78	176	38	145	47	123
	APR-SEP	104	78	188	44	158	50	134
MISSOURI RIVER at Fort Benton 2	APR-JUL	2840	82			4090	1630	3470
	APR-SEP	3440	86			4880	1960	3990
MISSOURI RIVER at Virgelle 2	APR-JUL	3290	83			5110	2020	3960
	APR-SEP	3880	86			6000	2170	4500
MISSOURI RIVER near Landusky 2	APR-JUL	3640	84			5710	1960	4310
	APR-SEP	4300	88			6700	2390	4900
N.F. MUSSELSHELL near Delpine	APR-JUL	4.4	79	8.2	1.4	6.9	1.9	5.6
	APR-SEP	5.2	81	9.3	1.6	8.0	2.4	6.4
S.F. MUSSELSHELL above Martinsdale	APR-JUL	48	84	92	14.4	73	23	57
	APR-SEP	50	82	96	15.8	77	23	61
MISSOURI RIVER below Fort Peck 2	APR-JUL	3660	86			5880	1960	4260
	APR-SEP	4200	88			6700	2230	4800
LAKE SAKAKAWEA Inflow 2	APR-JUL	9790	89			14300	5500	11000
	APR-SEP	10900	89			15900	6260	12200

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
CANYON FERRY LAKE	2043.0	1426.0	1526.0	1719.0
HELENA VALLEY	9.2	5.1	6.2	5.7
LAKE HELENA	10.4	10.9	10.9	10.3
HAUSER & HELENA	61.9	62.5	63.1	61.4
HOLTER LAKE	81.9	80.0	81.0	75.8
SMITH RIVER	10.6	1.4	2.4	6.4
NEWLAN CREEK	12.4	7.1	8.8	8.8
BAIR	7.0	0.6	1.9	3.8
MARTINSDALE	23.1	0.2	3.1	9.8
DEADMAN'S BASIN	72.2	10.7	35.8	42.6
FORT PECK LAKE*	18.9	12.8	15.3	15.4

*Millon Acre Feet

WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	THIS YEAR AS % OF AVERAGE
MISSOURI HEADWATERS	78	163	96
WEST SIDE MISSOURI	9	139	69
SMITH-BELT	7	164	72
MISSOURI MAINSTEM	16	152	71
SUN-TETON-MARIAS	12	164	83
JUDITH-MUSSELSHELL	11	171	63
MISSOURI above FORT PECK	104	164	91
MILK HEADWATERS	5	185	65
BEAR PAW	7	66	43
MILK RIVER	12	141	60
MISSOURI in MONTANA	113	163	89
MISSOURI blw YELLOWSTONE	158	155	86

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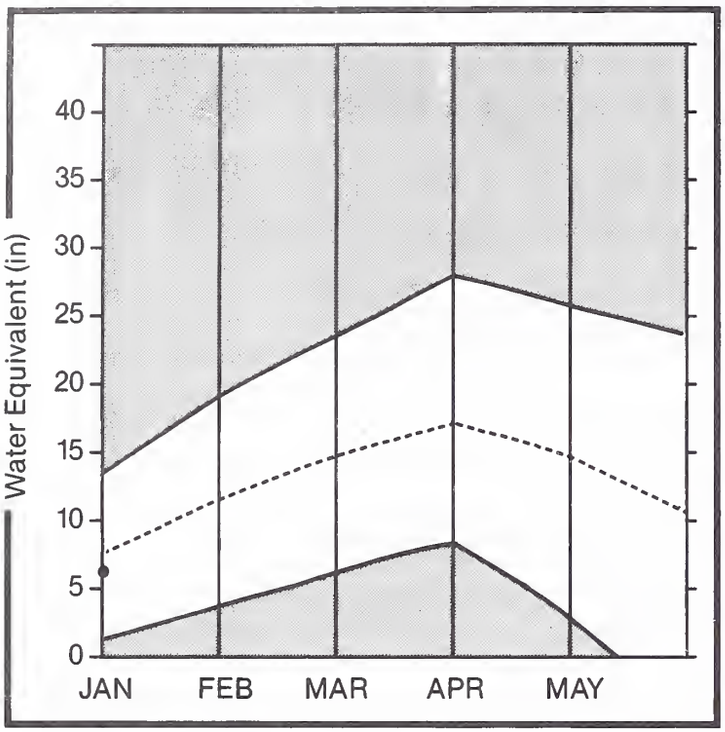
Sun, Teton and Marias Basins

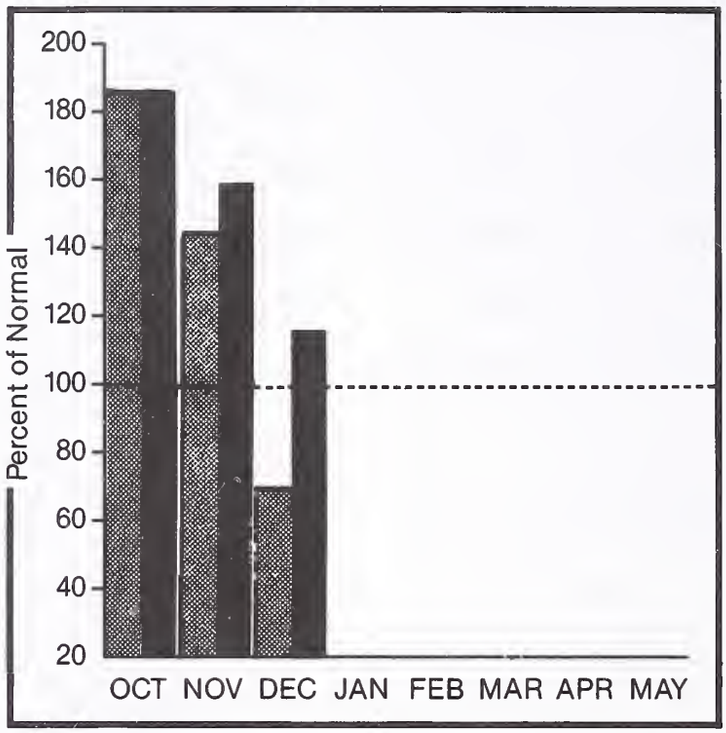
Mountain snowpack* (inches)



*Sun-Teton-Marias

Maximum
Minimum
Average
Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation
Year to date precipitation

Water Supply Outlook

October and November precipitation was generally well above average in the mountains. However, December recorded below average amounts. The mountain snowpack is currently about 80 to 85 percent of average.Moisture in the soil under the snow is near to a little below average. Runoff during this spring and summer is forecast to be a little below average.

For more information contact your local Soil Conservation Service office.

SUN-TETON-MARIAS RIVER BASINS

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
SUN RIVER at Gibson Dam 2	APR-JUL	430	87	650	210	570	290	494
	APR-SEP	470	87	705	235	620	320	542
TWO MEDICINE CREEK near Browning 2	APR-JUL	205	92	315	96	295	116	222
	APR-SEP	215	91	325	105	305	126	235
BADGER CREEK near Browning	APR-JUL	102	95	147	57	145	59	107
	APR-SEP	118	96	166	70	165	71	123
SWIFT RESERVOIR Inflow nr Dupuyer	APR-JUL	66	94	95	37	94	38	70
	APR-SEP	77	94	107	47	108	46	82
MARIAS RIVER near Shelby	APR-JUL	380	79			845	198	478
	APR-SEP	400	80			880	240	501

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
GIBSON	99.1	17.4	47.5	39.6
PISHKUN	32.0	19.9	18.3	18.4
WILLOW CREEK	32.2	22.9	23.5	20.1
LOWER TWO MEDICINE LAKE	11.9	11.9	10.3	7.4
FOUR HORNS LAKE	19.2	14.0	13.7	12.2
SWIFT	30.0	9.8	22.5	12.0
LAKE FRANCES	112.0	41.8	94.1	68.6
LAKE ELWELL (TIBER)	1347.0	650.8	722.0	562.8

WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	THIS YEAR AS % OF AVERAGE
SUN-TETON	6	166	84
MARIAS	6	163	82
SUN-TETON-MARIAS	12	164	83

WET SUBS. and DRY SUBS. represent 150 and 50 percent subsequent precipitation events respectively.
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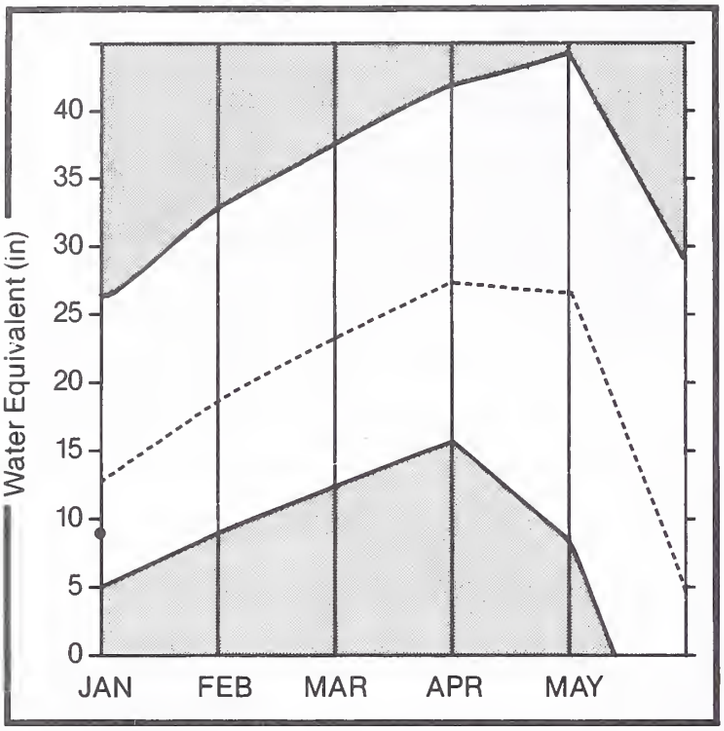
St. Mary and Milk Basins

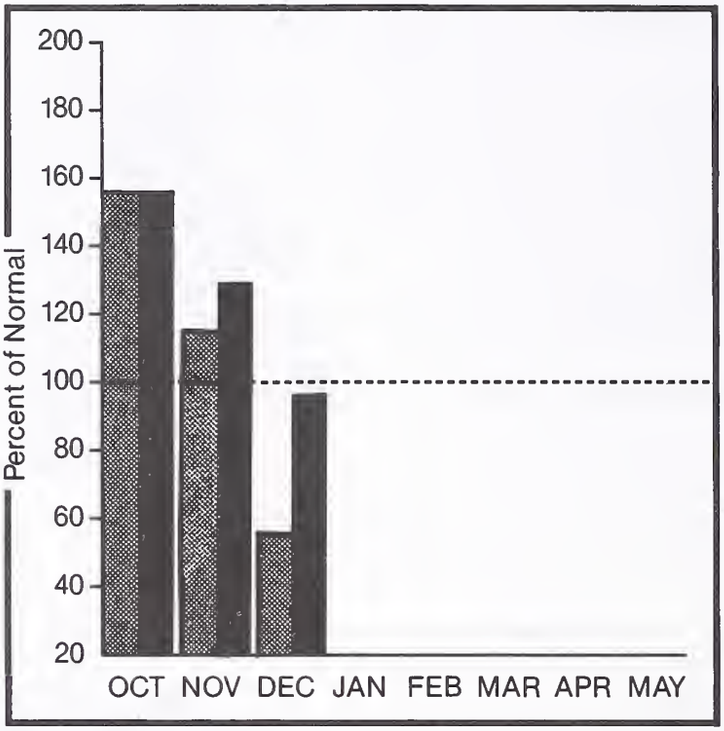
Mountain snowpack* (inches)



*St. Mary

Maximum
Minimum
Average
Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation
Year to date precipitation

Water Supply Outlook

Mountain precipitation was above average in October. November remained a little above average but then dropped to about one-half of normal in December. The snowpack is well below average in all drainages. It varies from 60 to 70 percent of average near the Continental Divide down to about 40 to 45 percent of average in the Bear Paw Mountains. Mountain soils are a little drier than usual. Streamflow for the spring and summer period is forecast to be a little below average in the Milk River system.

For more information contact your local Soil Conservation Service office.

ST. MARY and MILK RIVER BASINS

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
SWIFTCURRENT CREEK at Sherburne 2	APR-JUL	96	87	126	66	125	67	110
	APR-SEP	114	89	143	83	147	81	128
ST. MARY RIVER near Babb 2	APR-JUL	355	88	465	245	435	275	404
	APR-SEP	415	88	530	300	510	320	474
MILK RIVER at Eastern Crossing	MAR-SEP	78	80			141	52	97

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
LAKE SHERBURNE	64.3	25.9	35.8	18.8
FRESNO	127.0	8.4	64.0	53.5
BEAVER CREEK	3.5	4.8	2.8	1.8
NELSON	66.8	4.2	47.1	38.9

WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	AVERAGE
MILK HEADWATERS	5	185	65
BEAR PAW	7	66	43
MILK RIVER	12	141	60
ST. MARY	6	172	69
ST. MARY and MILK	13	149	64
BOW RIVER in ALBERTA	0	0	0
OLDMAN RIVER in ALBERTA	0	0	0

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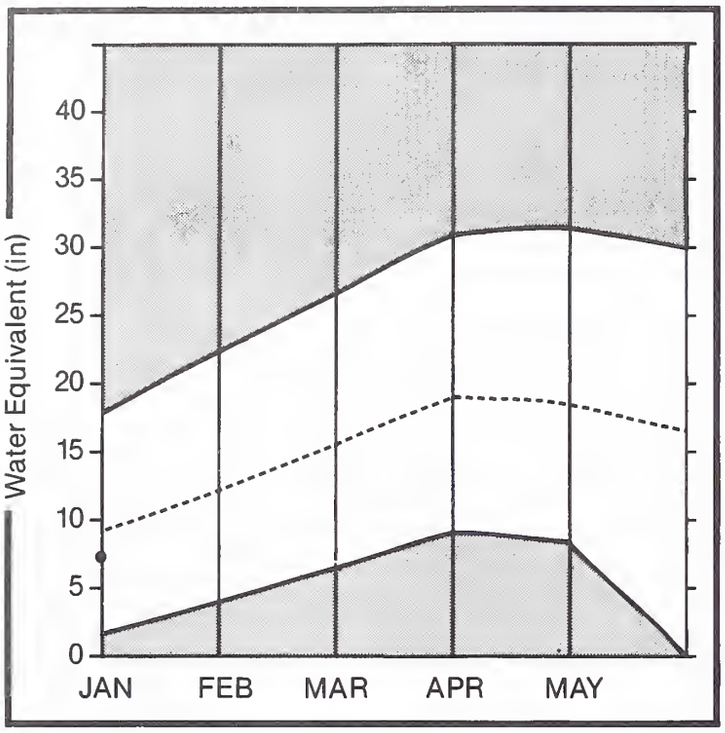
REAS. MAX. and REAS. MIN. forecasts are for 10% and 90% exceedance levels with the exception of (1) below.
(1) - REAS. MAX. and REAS. MIN. forecasts are for 5% and 95% exceedance levels.
(2) - Corrected for upstream diversions or changes in reservoir storage.

Yellowstone Basin

Mountain snowpack* (inches)



*Yellowstone above Big Horn

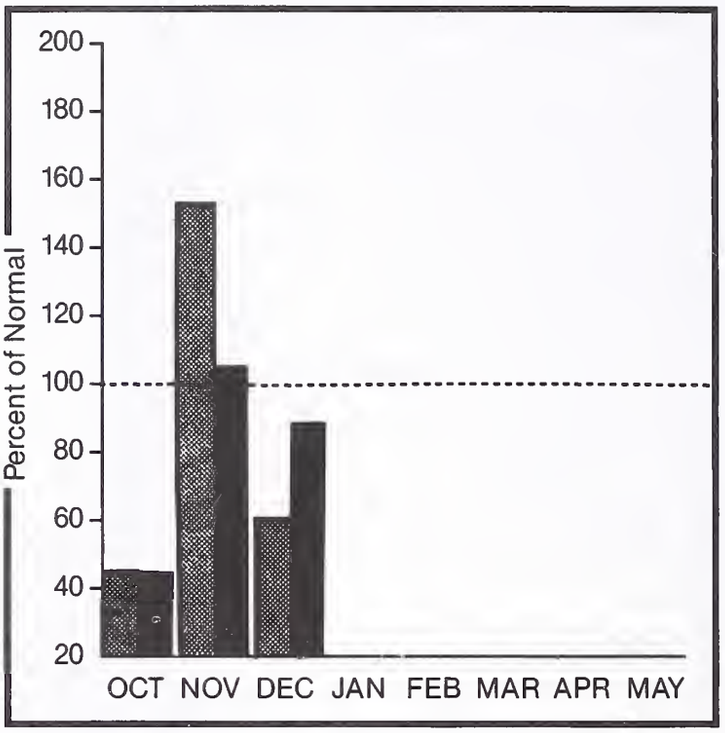
Maximum

Minimum

Average

Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation

Year to date precipitation

Water Supply Outlook

October was quite dry in the mountains with less than one-half normal moisture over the drainage. November precipitation was above average with December amounts dropping to well below average. Snowpacks vary from near average in the upper Yellowstone River headwaters in Yellowstone National Park to 60 to 75 percent of average on most downstream tributaries. Soils under the snow are drier than usual. Streamflow this spring and summer is expected to be near to a little above average in the upper Yellowstone dropping to below average on downstream drainages.

For more information contact your local Soil Conservation Service office.

CLARK FORK RIVER BASIN above Missoula

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
MOULTON RESERVOIR inflow (2)	APR-JUN	175	74	240	111	245	104	237
	APR-JUL	195	74	270	121	275	116	263
WARM SPRINGS CK nr Anaconda (2)	APR-JUL	28	72	38	19.4	40	16.3	39
	APR-SEP	35	71	46	25	50	20	49
FLINT CK nr Southern Cross (2)	APR-JUL	12.1	87	17.7	6.5	17.7	6.5	14.0
	APR-SEP	14.2	84	21	7.2	21	7.4	17.0
FLINT CK bl Boulder Ck (2)	APR-JUL	51	84	73	29	75	27	61
	APR-SEP	65	83	90	39	96	34	78
LOWER WILLOW CK RES inflow (2)	APR-JUL	12.3	88	20	4.5	17.9	6.7	14.0
	APR-SEP	13.7	91	20	6.5	19.7	7.7	15.0
MF ROCK CK nr Philipsburg	APR-JUL	63	91	80	45	84	42	69
	APR-SEP	70	91	87	52	93	47	77
NEVADA CK nr Finn	APR-JUL	16.1	77	24	8.1	25	7.7	21
	APR-SEP	17.3	79	26	8.9	26	8.5	22
BLACKFOOT nr Bonner	APR-JUL	790	90	1040	535	1040	485	874
	APR-SEP	875	90	1140	625	1160	535	969
CLARK FORK ab Milltown (2)	APR-JUL	595	85	790	390	850	340	703
	APR-SEP	685	84	890	465	975	395	812
CLARK FORK ab Missoula	APR-JUL	1380	88	1810	940	2040	720	1577
	APR-SEP	1560	88	2010	1100	2310	810	1781

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
GEORGETOWN LAKE	31.0	24.9	26.2	28.2
LOWER WILLOW CREEK		NO REPORT		
NEVADA CREEK	12.6	0.9	1.3	3.9

WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	AVERAGE
CLARK FORK ab BLACKFOOT	34	116	64
BLACKFOOT	17	136	76
CLARK FORK above MISSOULA	46	121	68

WET SUBS. and DRY SUBS. represent 150 and 50 percent subsequent precipitation events respectively.
REAS. MAX. and REAS. MIN. forecasts are for 10% and 90% exceedance levels with the exception of (1) below.
(1) - REAS. MAX. and REAS. MIN. forecasts are for 5% and 95% exceedance levels.
(2) - Corrected for upstream diversions or changes in reservoir storage.

Snow Data Measurements

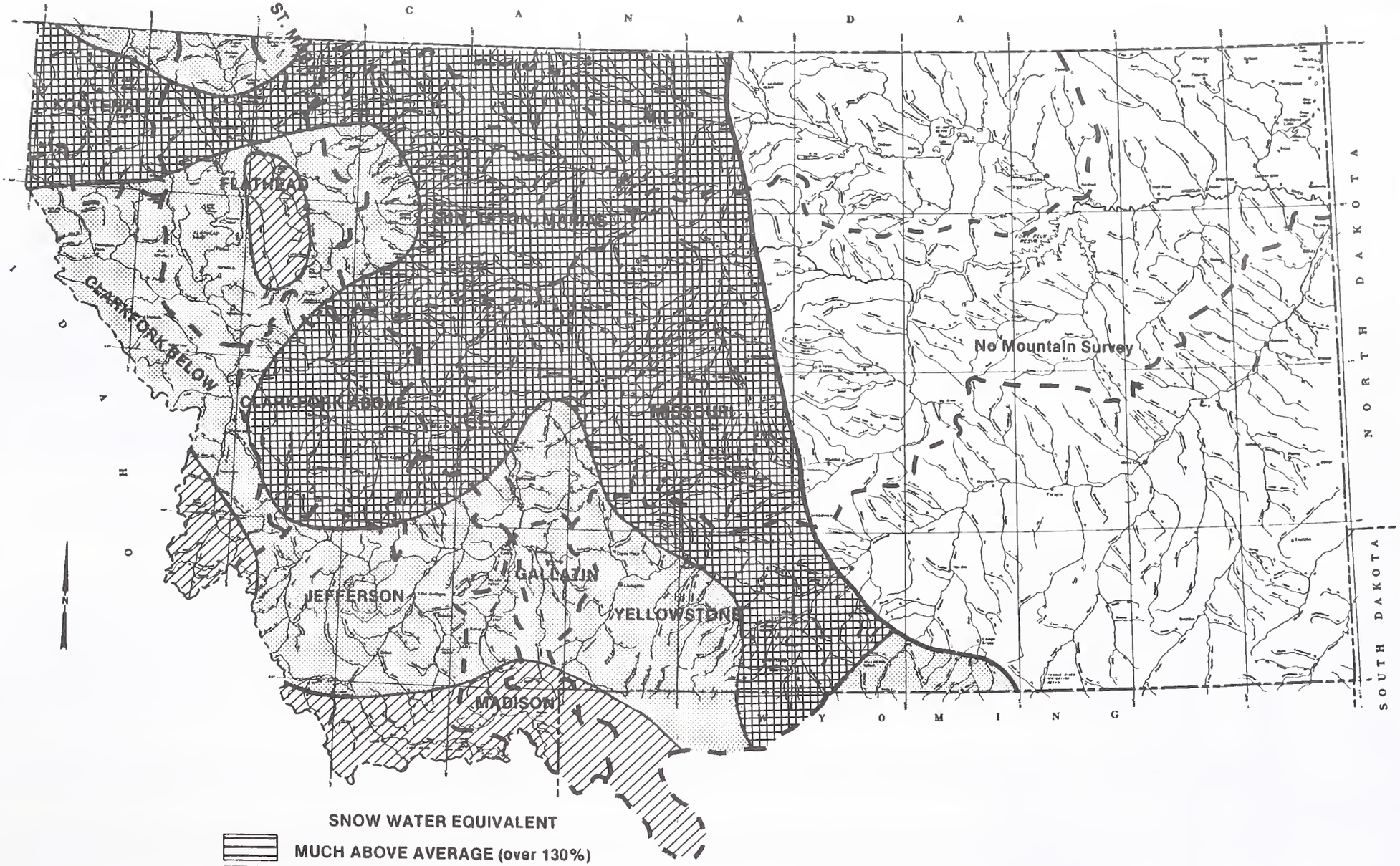
SNOW COURSE	ELEVATION	DATE	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE 1961-85
MONTANA						
ARCH FALLS	7350	12/29/88	19	3.8	2.6	5.3
ASHLEY DIVIDE	4820	1/02/89	16	2.5	2.0	3.5
BADGER PASS PILLOW	6900	1/01/89	---	13.3	8.2	15.5
BANFIELD MTN PILLOW	5600	1/01/89	---	7.1	6.3	9.4
BANFIELD MOUNTAIN	5600	12/28/88	24	5.8	4.2	11.6
BARKER LAKES	8250	12/28/88	20	4.3	3.7	7.5
BARKER LAKES PILLOW	8250	1/01/89	---	4.8	4.3	7.7
BASIN CREEK	7180	12/29/88	12	1.6	2.3	4.3
BASIN CREEK PILLOW	7180	1/01/89	---	2.0	2.2	3.7
BEAGLE SPGS PILLOW	8850	1/01/89	---	3.3	4.1	3.7
BEAR PAW SKI AREA	5200	12/27/88	10	1.0	2.2	2.7
BEAVER CREEK PILLOW	7850	1/01/89	---	8.3	5.3	8.7
BIG SKY	7700	1/06/89	36	5.1	3.6	6.9
BLACK BEAR	7950	12/28/88	65	20.2	13.4	17.6
BLACK BEAR PILLOW	7950	1/01/89	---	18.5	12.6	16.8
BLACK PINE PILLOW	7100	1/01/89	---	3.7	4.1	5.8
BLACK PINE	7100	12/29/88	17	3.1	3.1	4.9
BLACKTAIL	5650	1/11/89	38	8.4	--	--
BLOODY DICK PILLOW	7550	1/01/89	---	4.7	4.2	6.3
BOULDER MTN PILLOW	7950	1/01/89	---	7.6	4.7	10.0
BOX CANYON PILLOW	6700	1/01/89	---	3.3	2.8	4.3
BOXELDER CREEK	5100	12/27/88	14	1.7	2.5	4.6
BRIDGER BOWL PILLOW	7250	12/28/88	---	8.4	4.7	11.3
BRIDGER BOWL	7250	12/28/88	36	9.4	4.9	11.2
BULL MOUNTAIN	6600	12/29/88	10	1.2	1.6	2.4
CALVERT CR PILLOW	6430	1/01/89	---	3.2	3.2	4.6
CARROT BASIN PILLOW	9000	1/01/89	---	12.2	7.0	12.8
CASHE CREEK PILLOW	7800	1/01/89	---	5.1	3.6	4.2
CHESSMAN RESERVOIR	6200	12/30/88	8	1.3	.6	1.5
CLOVER MDW PILLOW	8800	1/01/89	---	6.4	5.2	8.2
COLE CREEK	7850	12/29/88	23	5.4	2.6	8.5
COLE CREEK PILLOW	7850	1/01/89	---	4.6	3.5	7.8
COMBINATION	5600	12/29/88	7	1.3	1.4	2.2
COMBINATION PILLOW	5600	1/01/89	---	1.7	2.1	2.6
COPPER BOTTOM PILLOW	5200	1/01/89	---	4.6	3.3	6.3
COPPER CAMP PILLOW	6950	1/01/89	---	11.3	7.4	16.2
COYOTE HILL	4200	12/30/88	22	3.0	2.8	4.3
CRYSTAL LAKE PILLOW	6050	1/01/89	---	3.2	3.7	6.5
DAISY PEAK	7600	12/28/88	12	1.8	1.6	5.8
DALY CREEK PILLOW	5780	1/01/89	---	3.9	3.3	5.3
DARKHORSE LK. PILLOW	8700	1/01/89	---	8.8	7.1	12.3
DEADMAN CR PILLOW	6450	1/01/89	---	3.3	2.4	4.8
DEVILS SLIDE	8100	12/29/88	27	6.4	3.7	10.0
DISCOVERY BASIN	7050	12/29/88	19	3.5	2.6	4.8
DIVIDE PILLOW	7800	1/01/89	---	5.7	3.2	4.8
DIX HILL	6400	12/26/88	15	3.2	2.4	5.4
DUPUYER CREEK PILLOW	5750	1/01/89	---	4.3	1.3	5.1
EMERY CREEK	4350	1/04/89	37	8.3	4.8	7.8
EMERY CREEK PILLOW	4350	1/01/89	---	4.8	3.9	7.9
FISH CREEK	8000	12/29/88	14	1.8	2.8	4.5
FISHER CREEK PILLOW	9100	1/01/89	---	13.2	8.3	16.2
FLATTOP MTN PILLOW	6300	1/01/89	---	16.9	11.2	21.3
FLEECER RIDGE	7500	12/29/88	20	3.6	3.2	4.7
FROHNER MEADOWS	6480	12/30/88	14	2.2	1.5	3.9
FROHNER MDWS PILLOW	6480	1/01/89	---	2.5	1.3	4.2
GARVER CREEK	4250	12/28/88	20	2.8	3.3	5.6
GIBBONS PASS	7100	12/30/88	35	9.4	5.9	9.7
GRAVE CRK PILLOW	4300	1/01/89	---	8.0	3.8	8.7
HAND CREEK PILLOW	5030	1/01/89	---	4.0	2.9	6.4
HAWKINS LAKE PILLOW	6450	1/01/89	---	9.0	8.8	12.8
HAWKINS LAKE	6450	12/28/88	38	8.6	9.5	15.4
HEART LAKE TRAIL	4800	1/01/89	37	7.2	5.0	9.2
HEBGEN DAM	6550	12/29/88	29	6.0	2.6	5.0
HELL ROARING DIVIDE	5770	1/02/89	62	13.4	7.4	13.6
HOOD MEADOW	6600	12/29/88	19	3.8	2.6	4.9
HOODOO BASIN PILLOW	6050	1/01/89	---	16.4	11.2	20.3
HOODOO BASIN	6050	1/01/89	70	17.2	13.0	21.5
HOODOO CREEK	5900	1/01/89	67	15.8	9.8	19.1
JOHNSON PARK	6450	12/28/88	10	1.4	1.2	3.7
KINGS HILL	7500	12/27/88	18	3.6	2.8	6.6
KIWANIS CAMP	3720	12/27/88	7	.5	.6	1.1
KRAFT CREEK PILLOW	4750	1/01/89	---	7.2	3.1	5.7
LAKEVIEW CANYON	6930	12/28/88	31	6.2	1.3	5.4
LAKEVIEW RDG. PILLOW	7400	1/01/89	---	7.7	2.7	6.4
LAKEVIEW RIDGE	7400	12/28/88	30	6.2	1.2	4.8
LEMHI RIDGE PILLOW	8100	1/01/89	---	4.3	3.5	4.9
LICK CREEK PILLOW	6860	1/01/89	---	4.8	3.4	4.1
LICK CREEK	6860	12/29/88	20	4.2	2.5	4.2
LONE MOUNTAIN	8880	1/06/89	45	7.6	5.0	10.4
LOWER TWIN PILLOW	7900	1/01/89	---	7.2	4.9	10.1
LUBRECHT PILLOW	4680	1/01/89	---	2.0	2.3	2.5
LUBRECHT FOREST NO 3	5450	1/04/89	12	2.3	1.3	2.7
LUBRECHT FOREST NO 4	4650	1/04/89	5	.8	.7	1.5
LUBRECHT FOREST NO 6	4040	1/04/89	6	.8	.8	1.7
LUBRECHT HYDROPLOT	4200	1/04/89	11	2.0	1.5	3.2
MADISON PLT PILLOW	7750	1/01/89	---	13.0	7.1	10.6
MADISON PLATEAU	7750	12/28/88	44	11.9	7.5	9.3
MANY GLACIER	4900	12/30/88	22	4.8	1.7	9.6
MANY GLACIER PILLOW	4900	1/01/89	---	5.0	1.8	9.4
MARIAS PASS	5250	12/29/88	20	4.6	2.6	7.1
MAYNARD CREEK	6210	12/28/88	21	5.0	2.6	6.1
MAYNARD CR PILLOW	6210	12/28/88	---	4.2	1.8	5.2
MONUMENT PK PILLOW	8850	1/01/89	---	7.3	3.5	9.6
MOSS PEAK PILLOW	6780	1/01/89	---	14.4	8.0	17.9
MOULTON RESERVOIR	6850	12/23/88	14	2.7	3.0	2.3
MT LOCKHART PILLOW	6400	1/01/89	---	7.7	5.4	9.2
MULE CREEK PILLOW	8300	1/01/89	---	6.3	4.3	5.7
NEVADA CREEK PILLOW	6480	1/01/89	---	5.8	3.0	5.2
NEZ PERCE CMP PILLOW	5650	1/01/89	---	6.0	4.5	6.7
NEZ PERCE CAMP	5650	12/31/88	25	5.1	3.8	6.5
NEZ PERCE CREEK	6600	12/31/88	25	5.0	--	3.6
NOISY BASIN PILLOW	6040	1/01/89	---	20.1	9.2	17.4
N.F. ELK CR PILLOW	6250	1/01/89	---	3.5	3.0	5.0
NORTH FORK JOCKO	6330	12/28/88	67	17.0	9.7	18.7
N.E. ENTRANCE PILLOW	7350	1/01/89	---	3.6	2.2	4.1
NORTHEAST ENTRANCE	7350	12/31/88	18	3.3	1.6	3.8
OPHIR PARK	7150	12/26/88	22	4.9	3.7	7.3
PETERSON MDW PILLOW	7200	12/27/88	---	2.6	2.7	4.8
PETERSON MEADOWS	7200	12/27/88	15	2.4	2.6	4.6
PICKFOOT CRK PILLOW	6650	1/01/89	---	4.3	2.7	4.5
PIKE CREEK	5930	12/27/88	29	7.6	5.0	11.0
PIKE CREEK PILLOW	5930	1/01/89	---	10.0	6.2	12.3
PIPESTONE PASS	7200	12/27/88	11	2.0	1.2	2.2
PLACER BASIN PILLOW	8830	1/01/89	---	9.7	4.7	8.0
PORCUPINE PILLOW	6500	1/01/89	---	2.0	.8	3.3
RED MOUNTAIN	6000	12/29/88	35	5.8	3.6	8.7
ROCKER PEAK PILLOW	8000	1/01/89	---	3.6	3.2	6.6
ROCKY BOY	4700	12/27/88	8	.5	2.0	1.7
ROCKY BOY PILLOW	4700	12/27/88	---	1.6	1.7	2.5
SADDLE MTN PILLOW	7900	1/01/89	---	10.4	7.2	12.0
SADDLE MOUNTAIN	7940	12/30/88	37	10.3	6.4	11.0
SHORT CREEK	7000	1/01/89	---	2.4	1.9	--
SHOWER FALLS	8100	12/29/88	28	6.6	4.2	10.9
SHOWER FALLS PILLOW	8100	1/01/89	---	7.2	5.8	11.0
SILVER RUN PILLOW	6630	1/01/89	---	2.0	1.9	2.2
SKALKAHO PILLOW	7260	1/01/89	---	7.5	7.0	11.4
SKYLARK TRAIL PILLOW	6200	1/01/89	---	13.6	7.7	12.5
S.F. SHIELDS PILLOW	8100	1/01/89	---	6.0	2.6	8.3
SPOTTED BEAR MTN.	7000	1/07/89	30	6.8	4.0	6.9
SPUR PARK PILLOW	8100	1/01/89	---	7.3	4.1	10.6
STAHL PEAK PILLOW	6030	1/01/89	---	15.6	8.7	19.1
STORM LAKE	7780	12/27/88	21	4.1	3.4	5.7
STUART MOUNTAIN	7400	12/28/88	48	11.8	10.3	13.5
SUCKER CREEK	3960	12/27/88	7	.6	.0	.6
TAYLOR ROAD	4080	12/27/88	9	.7	1.0	2.2
TEN MILE LOWER	6600	12/29/88	13	2.2	1.6	3.1
TEN MILE MIDDLE	6800	12/29/88	17	3.2	2.8	4.8
TEN MILE UPPER	8000	12/29/88	19	4.0	3.2	5.8
TEPEE CREEK PILLOW	8000	1/01/89	---	6.6	4.7	6.5
TRINKUS LAKE	6100	1/07/89	76	22.0	12.2	18.0
TRUMAN CREEK	4060	12/29/88	10	1.6	--	2.0
TV MOUNTAIN	6800	12/28/88	25	4.8	4.9	7.8
TWELVEMILE PILLOW	5600	1/01/89	---	7.7	5.7	7.4
TWENTY-ONE MILE	7150	12/29/88	33	7.2	3.8	7.7
TWIN LAKES PILLOW	6400	1/01/89	---	16.0	11.1	17.7
UPPER HOLLAND LAKE	6200	1/07/89	69	18.5	8.2	16.6
WALDRON PILLOW	5600	1/01/89	---	4.5	2.9	4.8
WARM SPRINGS	7800	12/27/88	26	6.0	4.4	11.3
WARM SPRINGS PILLOW	7800	1/01/89	---	7.1	5.4	12.5
WEST YELLOWSTONE	6700	12/30/88	24	4.6	2.0	5.1
WHISKEY CREEK PILLOW	6800	1/01/89	---	8.4	4.2	7.6
WHISKEY CREEK	6800	12/28/88	41	10.3	5.1	7.7
WHITE MILL PILLOW	8700	1/01/89	---	9.4	4.8	11.9
WILLOW CREEK	6500	12/29/88	14	2.9	1.1	3.7
WOOD CREEK PILLOW	5960	1/01/89	---	2.9	1.9	4.0

ADDITIONAL SNOW DATA FOR DECEMBER 1, 1988

SNOW COURSE	ELEVATION	DATE	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE 1961-85
DESERT MTN.	5600	12/2/88	12	2.2	2.0	2.9
N FK JOCKO	6330	12/1/88	48	12.0	11.8	8.2
SPOTTED BEAR MTN.	7000	12/1/88	14	3.4	3.4	3.0
TRINKUS LAKE	6100	12/1/88	38	10.1	10.1	8.3
UPPER HOLLAND LK	6200	12/1/88	36	9.0	8.9	7.1

U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE



MOUNTAIN SNOWWATER EQUIVALENT FOR MONTANA

SNOW WATER EQUIVALENT

- MUCH ABOVE AVERAGE (over 130%)
- ABOVE AVERAGE (110-130%)
- NEAR AVERAGE (90-110%)
- BELOW AVERAGE (70-90%)
- MUCH BELOW AVERAGE (below 70%)
- NO MOUNTAIN SURVEY

%1961-85 AVERAGE

JANUARY 1,1989

0 25 50 75 100 MI

0 50 100 150 KM

SOURCE:
Information provided by SCS Snow Survey Personnel.

JUNE 1985 4-R-39296-1

The Following Organizations Cooperate With The Soil Conservation Service In Snow Survey Work

Canadian

Department of the Environment
- Atmospheric Environment Service
- Water Management Service

British Columbia Ministry of Environment
- Inventory and Engineering Branch, Hydrology Section

Alberta Environment
- Technical Services Division

Federal

U.S. Department of Agriculture
- Forest Service

U.S. Department of the Army
- Corps of Engineers

U.S. Department of Commerce
- NOAA, National Weather Service
- National Environmental Satellite Service

U.S. Department of the Interior
- Bureau of Indian Affairs
- Fish and Wildlife Service
- Geological Survey
- National Park Service
- Bureau of Reclamation

U.S. Department of Energy
- Bonneville Power Administration

State

Montana Conservation Districts
Montana Department of Fish, Wildlife, and Parks
Montana Department of Natural Resources and Conservation
Montana Department of State Lands
Montana State University - Agricultural Experiment Station
University of Montana - School of Forestry

Private

Big Sky of Montana
Butte Water Company
Confererated Salish & Kootenai Tribes
Flathead Valley Comminity College
Montana Power Company
Pondera County Canal & Reservoir Company

Other organizations and individuals furnish information for the snow survey reports.
Their cooperation is gratefully acknowledged.

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
SNOW SURVEY UNIT
Federal Bldg., Rm. 443
10 East Babcock Street
Bozeman, MT 59715

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Water Supply Outlook

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Federal-State-Private
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